The pectination seems to attain its greatest development in the nightjars; and it has been said that these birds utilize it for the purpose of cleaning their mouth-bristles. But the bristles and the pectination do not by any means always occur together, even among the nightjars; while many other birds (*e.g.* barbets) have the former without the serration.

In order to investigate the point, I procured a young common heron (*Ardea cinerea* ♂?) in June last, and have had the bird under more or less close observation from that time until the middle of October. It fed freely for the most part, and continued healthy during the whole of this time. Its food, whether living or dead, and whether taken from water or from the ground, was never touched at all by the feet. The only use to which the serrated claw was put, that I could observe, was that of scratching the cheeks and throat. In this action—which occurred most frequently after a meal—the two other front toes were curved down, so as to leave the middle claw free.

It is, however, the case that other birds, in which the pectination is absent, use the middle claw alone in scratching. Nor would the presence of this peculiarity seem to give any great advantage to its possessor in this connection, owing to its lateral position. I fear, therefore, that I can claim to have done no more than disprove experimentally what hardly needed disproving—the popular theory alluded to above.

Inselstrasse 13, Leipzig, Nov. 25. E. B. TITCHENER.

The Common Sole.

THE correction from Mr. Green, H.M. Inspector of Irish Fisheries, which is published in NATURE of November 20 (p. 56), and which announces that the specimens he at first believed to be the young of the common sole proved to be really the young of *Pleuronectes cynoglossus*, is one more instance of the great importance of specific identification in the investigation of fishery problems. This was a mistake not merely as to the species, but as to the genus of the specimens in question. And yet it is by no means difficult, after a little experience, to distinguish the genus *Solea* at any stage of development from all other genera of *Pleuronectidæ*. It is much more difficult to distinguish from one another the various species of Gadus in their early stages. But in order to ascertain the life-history of the various species of sea-fish used as food, we must trace each with absolute certainty from one environment to another through the successive stages of its existence.

It is natural enough that the young fry of *Pleuronectes cynoglossus* should be found in deep water. The adult of this species has an exceedingly wide bathymetrical range. It is found in abundance on our ordinary trawling grounds in the North Sea at 15 to 30 fathoms, and I have taken it in numbers in the Firth of Clyde. In the same region which Mr. Green investigated, Mr. G. C. Bourne found it at 70 fathoms and at 200 fathoms. The Norwegian North Atlantic Expedition found it at 125 to 150 fathoms off the Lofoten Islands, while on the North American side of the Atlantic it has been taken at 120, 263, 395, 603, and 732 fathoms. On the other hand, *Solea vulgaris* has never been found at a much greater depth than 60 fathoms.

Seeing that I have found young soles immediately after metamorphosis between tide-marks, it would have been extremely surprising if the next stage only occurred beyond 50 fathoms. Most probably the fry of the sole will be found pretty uniformly distributed over the grounds where the adults live. After the stage I have mentioned, they are not found in shallow water. I have some evidence that the above suggestion is true, for specimens from 3 to 6 inches in length have been recorded for us as captured by the large beam-trawl in the North Sea in February and March. These specimens would be a year old: in order to find younger and smaller specimens between June and Christmas a small-meshed trawl would have to be worked on the ordinary trawling grounds. The Marine Biological Association has not at present sufficient funds to give me the means of doing this. I have had to obtain my results by going out in deep-sea trawlers, living with the men, and taking whatever opportunities occurred in the course of the regular fishing operations. J. T. CUNNINGHAM.

Marine Biological Laboratory, Plymouth, Nov. 21.

Weights Proceeding by Powers of 3.

THE following rule gives the allocation of weights of 1, 3, 9, &c., necessary for making up any given weight.

Find the least value of $\frac{1}{2}(3^n - 1)$ which exceeds, or is equal to, the given weight. Add it to the given weight, and express the sum in the ternary scale. The digits will indicate the weights to be used, and the pan in which they are to be put, according to the following scheme:—

Digit 2 indicates the positive pan,
,, 0 ,, ,, negative ,,
,, 1 ,, that the weight is not to be used.

Example.—Let 500 be the given weight to be made up. The number to be added is $\frac{1}{2}(2187 - 1) = 1093$, and the work is as follows:—

			Positive pan.	Negative pan.
500				
1093				
3)1593				
3)531	remainder	0	—	1
3)177	,,	0	—	3
3)59	,,	0	—	9
3)19	,,	2	27	—
3)6	,,	1	—	—
3)2	,,	0	—	243
0	,,	2	729	—

756 − 256 = 500.

I should be glad to learn whether this rule has been previously published. J. D. EVERETT.

5 Princess Gardens, Belfast, November 18.

Measures of Lunar Radiation.

IN your issue of the 13th inst. (p. 44) you have, under the above heading, a notice of a paper in vol. xxiv. of the Proceedings of the American Academy of Arts and Sciences, by Mr. C. C. Hutchins.

The so-called "new thermograph" is obviously, with very slight differences in constructive details, the apparatus used here for some years past. We have employed the thermo-couple in place of the ordinary thermopile in our determinations of lunar radiant heat from the year 1870, and the condensing mirror of focal length about equal to its aperture from the commencement of our heat-work in 1869 (Proc. Roy. Soc., No. 112, 1869, and Nos. 122 and 123, 1870); and about four years ago we replaced the brittle bismuth and antimony alloys by the more tractable metals iron and German silver, for the same reasons which weighed with Mr. Hutchins.

We cannot give an unqualified assent to Mr. Hutchins's conclusions as to absorption of lunar radiant heat in our atmosphere, but I will defer remarks upon this for the present; I may say, however, now, that I have looked over Mr. Hutchins's paper, and he appears to have entirely overlooked Dr. Copeland's extensive and careful work here on the lunar phase curve and the law of absorption in our atmosphere (Phil. Trans., vol. clxiii. p. 587), or he would not have made the sweeping assertion that, "previous to the invention of the bolometer, no instrument existed capable of dealing accurately with so small an amount of heat as the moon affords," a statement which, from what I know of Prof. Langley, I feel confident he would not fully endorse, notwithstanding his success in working with that instrument.

In conclusion, may I congratulate Mr. Hutchins on having taken up with so much apparent manipulative skill and energy so interesting an investigation, and one in which the workers have been so few, and wish him every success? ROSSE.

Birr Castle, Parsonstown, November 29.

The Distances of the Stars.

IT is quite a familiar illustration to represent the distances of the stars in terms of the *light-year*, but I am not aware that it has been noticed that the same figures which express in years the time light occupies in reaching the earth from a star, will also express in miles the distance of the star upon a scale of the radius vector of the terrestrial orbit to the inch. The illustration appears to me useful, as it gives, perhaps, a more distinct idea of the isolation of the solar system in space than can be otherwise obtained, and does not introduce the question of time into the measurement of distance. Thus if the annual parallax of 61

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Cygni is assumed to be 0″·434, which is probably very nearly correct, it will take 7½ (7·464) years for its light to reach the earth, and 7½ (7·499) miles will represent the distance of this star on a scale that gives 1 inch to the distance of the sun from the earth.
JOHN I. PLUMMER.

8 Constitution Hill, Ipswich.

Great Waterfalls.

I SHALL be much obliged to any of your readers who can inform me where I can find descriptions of the waterfalls named below:—

Falls of the Rio Grande near Guadalajara, Mexico, referred to by Miss Kingsley in "South by West."

Falls in the Ala-tau Mountains, Central Asia, stated in the "Universal Geography" as consisting of falls of 600, 350, and 350 feet separated by rapids.

Lattin, in Swedish Lapland, stated in the "Universal Geography" as of the height of 400 feet. It is also mentioned in the "Popular Cyclopædia," but I could hear nothing of any waterfall of that name when travelling in Lapland some few years since.

Aguara-y, in Paraguay, also classed amongst the great waterfalls of the world in the table in the "Universal Geography," as of the height of 409 feet.

Falls of the Pykara, India.

Falls of the Ooma Oya and Badulla Oya, Ceylon.

Any particulars of any of these falls will be most useful.
ARTHUR G. GUILLEMARD.

Eltham, Kent, November 22.

AID TO ASTRONOMICAL RESEARCH.

A CIRCULAR was issued last summer announcing the gift by Miss Bruce of 6000 dollars for aiding astronomical research. No restrictions were made upon its expenditure which seemed likely to limit its usefulness, and astronomers of all countries were invited to make application for portions of it, and suggestions as to the best method of using it. Eighty-four replies have been received, and with the advice of the donor the entire sum has been divided so as to aid the following undertakings:—

(3) Prof. W. W. Payne, Director of the Carleton College Observatory. Illustrations of the *Sidereal Messenger*.

(6) Prof. Simon Newcomb, Superintendent of the *American Nautical Almanac*. Discussion of contact observations of Venus during its transits in 1874 and 1882.

(16) Dr. J. Plassmann, Warendorf. For printing observations of meteors and variable stars.

(23) Prof. H. Bruns, Treasurer of the Astronomische Gesellschaft. To the Astronomische Gesellschaft for the preparation of tables according to Gyldén's method for computing the elements of the asteroids.

(27) Prof. J. J. Astrand, Director of the Observatory, Bergen, Norway. Tables for solving Kepler's problem.

(29) Prof. J. C. Adams, Director of the Cambridge Observatory, England. Spectroscope for the 25-inch telescope of the Cambridge Observatory.

(36) Prof. A. Hirsch, Secretary of the International Geodetic Association. To send an expedition to the Sandwich Islands to study the annual variation, if any, in latitude.

(40) Mr. H. H. Turner, Assistant in Greenwich Observatory. Preparing tables for computing star corrections.

(45) Prof. Edward S. Holden, Director of the Lick Observatory. Reduction of meridian observations of Struve stars.

(46) Prof. Lewis Swift, Director of the Warner Observatory. Photographic apparatus for 15-inch telescope.

(54) Prof. Norman Pogson, Director of Madras Observatory. Publication of old observations of variable stars, planets, and asteroids.

(57) Dr. Ludwig Struve, Astronomer at Dorpat Observatory. Reduction of observations of occultations during the lunar eclipse of January 28, 1888, collected by the Pulkowa Observatory.

(60) Dr. David Gill, Director of the Observatory of the Cape of Good Hope. 1. Reduction of heliometer observations of asteroids. 2. Apparatus for engraving star charts of the Southern *Durchmusterung*.

(78) Prof. A. Safarik, Prague. Photometer for measuring variable stars.

(79) Prof. Henry A. Rowland, Johns Hopkins University. Identification of metals in the solar spectrum.

Of the remaining replies many describe wants no less urgent than those named above. Some relate to meteorology or physics rather than to astronomy, some to work already completed, and others were received too late to be included. Two important cases may be specially mentioned. In each of them an appropriation of a part of the sum required would have been made; but in one, in our own country, an active and honoured friend of the science undertakes the whole; and in the other, in France, the generous M. Bischoffsheim, already known as the founder of the great Observatory at Nice, ignoring political boundaries and the comparative selfishness of patriotism, came forward and gave the entire sum required. The same sky overarches us all. It is to be hoped that the above-named, and other foreign institutions, will obtain more important aid from neighbours when these become aware how highly the work of their men of science is appreciated in this country. The replies not enumerated above are confidential, and cannot be mentioned except by the permission of the writers. But they have placed me in possession of important information regarding the present needs of astronomers. In several cases a skilful astronomer is attached to a college which has no money for astronomical investigation. He has planned for years a research in the hope that some day he may be able to carry it out. A few hundred dollars would enable him to do this, and he offers to give his own time, taken from his hours of rest, if only he can carry out his cherished plans.

Such valuable results could be attained by the expenditure of a few thousand dollars, that no opportunity should be missed to secure this end. Fortunately, the number of persons in the United States able and willing to give liberally to aid astronomy is very large. It is hoped that some of them may be inclined to consider the case here presented. The income derived from a gift of one hundred thousand dollars would provide every year for several cases like those named above. A few thousand dollars would provide immediately for the most important of the cases now requiring aid. The results of such a gift would be very far-reaching, and would be attained without delay. Correspondence is invited with those wishing to aid any department of astronomy, either in large or small sums, by direct gift or by bequest.
EDWARD C. PICKERING.

Harvard College Observatory,
Cambridge, Mass., U.S.A., November 11, 1890.

NOTE ON THE DISAPPEARANCE OF THE MOA.[1]

MAJOR MAIR, in an interesting paper on the disappearance of the Moa in vol. xxii. of the Transactions of the New Zealand Institute, makes, on p. 71, the statement that he is a "supporter of the belief

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[1] Read before the Philosophical Institute of Canterbury, October 2, 1890, by H. O. Forbes, Director of the Canterbury Museum, Christchurch, New Zealand.

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